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# Joint analysis of celestial pole offset and free core nutation series

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## Abstract

© 2016 Springer-Verlag Berlin HeidelbergThree combined celestial pole offset (CPO) series computed at the Paris Observatory (C04), the United States Naval Observatory (USNO), and the International VLBI Service for Geodesy and Astrometry (IVS), as well as six free core nutation (FCN) models, were compared from different perspectives, such as stochastic and systematic differences, and FCN amplitude and phase variations. The differences between the C04 and IVS CPO series were mostly stochastic, whereas a low-frequency bias at the level of several tens of (Formula presented.)as was found between the C04 and USNO CPO series. The stochastic differences between the C04 and USNO series became considerably smaller when computed at the IVS epochs, which can indicate possible problems with the interpolation of the IVS data at the midnight epochs during the computation of the C04 and USNO series. The comparison of the FCN series showed that the series computed with similar window widths of 1.1–1.2 years were close to one another at a level of 10–20 (Formula presented.)as, whereas the differences between these series and the series computed with a larger window width of 4 and 7 years reached 100 (Formula presented.)as. The dependence of the FCN model on the underlying CPO series was investigated. The RMS differences between the FCN models derived from the C04, USNO, and IVS CPO series were at a level of approximately 15 (Formula presented.)as, which was considerably smaller than the differences among the CPO series. The analysis of the differences between the IVS, C04, and USNO CPO series suggested that the IVS series would be preferable for both precession-nutation and FCN-related studies.

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## Keywords

Celestial pole offset (CPO), Earth orientation parameters (EOP), Free core nutation (FCN), International Earth Rotation and Reference Systems Service (IERS), International VLBI Service for Geodesy and Astrometry (IVS), Very long baseline interferometry (VLBI)